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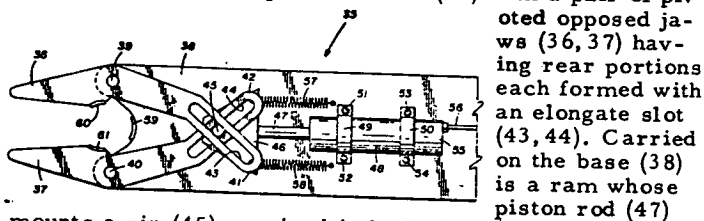
RIPPER FOR PIPE

DRES P62 =A9217W/04 =GB 1456-3
Pipe handling gripping device - has two jaws pivoting on baseplate under control of double acting ram

DRESSER INDUSTRIES INC 26.03.73-US-344655

Q49 +Q38 (24.11.76)*FR2223-543 E21b-19/14 +866c-01/44

The pipe gripper, esp. for handling drill pipe sections in earth boring, comprises a base (38) with a pair of piv-



oted opposed jaws (36, 37) having rear portions each formed with an elongate slot (43, 44). Carried on the base (38) is a ram whose piston rod (47) mounts a pin (45) received in both slots (43, 44). In operation, movement of the piston rod into the ram cylinder (48) closes the jaws (36, 37) to grip a pipe (62) between their curved portions (60, 61) and a grip portion (59) on the base (38). Tension springs (57) may be connected to urge the jaws (36, 37) to their closed positions. The springs (57) are secured to the base (38) and a plate (46) on the piston rod. 19.2.74 as 007561 (5pp)

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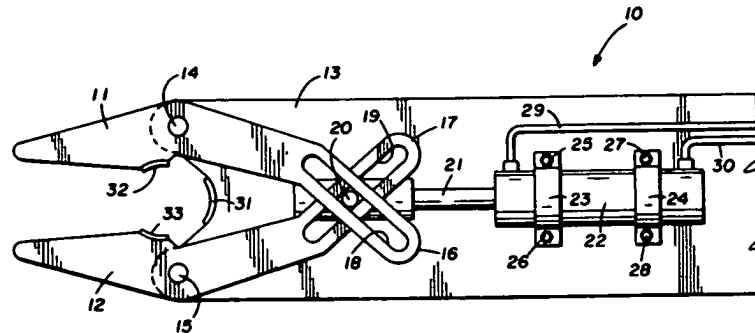


FIG. 1

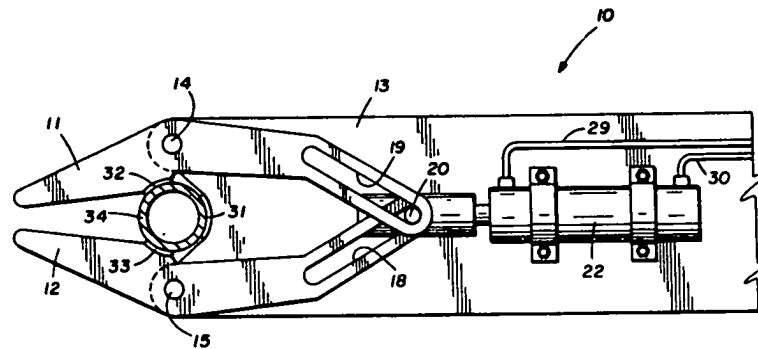


FIG. 2

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1456703

COMPLETE SPECIFICATION

2 SHEETS

*This drawing is a reproduction of
the Original on a reduced scale*

Sheet 2

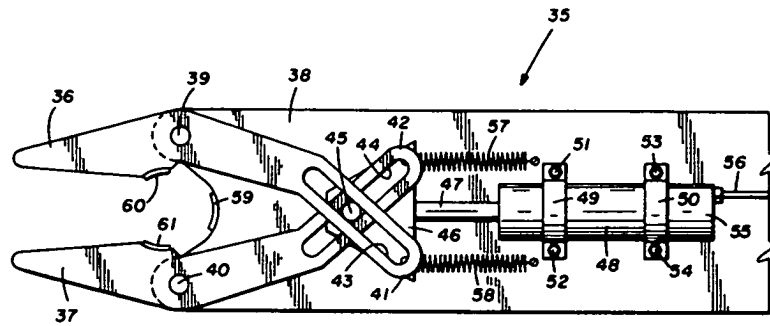


FIG. 3

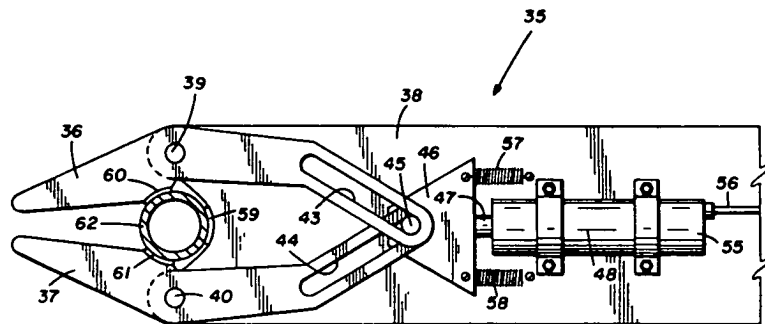


FIG. 4

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294
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PATENT SPECIFICATION

(11) 1 456 703

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- (21) Application No. 7561/74 (22) Filed 19 Feb. 1974
(31) Convention Application No. 344 655
(32) Filed 26 March 1973 in
(33) United States of America (US)
(44) Complete Specification published 24 Nov. 1976
(51) INT CL³ B66C 1/44//E21B 19/14
(52) Index at acceptance
B8H 21T 4 JA
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(19)

GREAT BRITAIN
GROUP 3/3
CLASS 294
RECORDED

(54) PIPE HANDLING APPARATUS

(71) We, DRESSER INDUSTRIES, INC., a corporation organised and existing under the laws of the State of Delaware, United States of America, of Republic National Bank Building, Dallas, Texas 75221, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the art of pipe handling and, more particularly, to a gripper for a pipe handling apparatus adapted for use with an earth boring machine.

During an earth boring operation, it is necessary to add sections of drill pipe to the drill string as the drilling operation proceeds. Each individual section of drill pipe must be lifted from a position near the earth boring machine and positioned in line with the drill string during the pipe adding operation. It also becomes necessary to remove sections of the drill pipe from the drill string during the earth boring operation. For example, it is often necessary to change drill bits during the earth boring operation and a substantial number of sections of drill pipe must be removed from the drill string during the changing of the drill bit.

Various systems have been provided for handling sections of drill pipe during an earth boring operation. In general, the systems include arm means for moving a section of drill pipe into and out of position in the earth boring machine with gripping means connected to the arm means for gripping an individual section of drill pipe.

In U.S. Patent No. 3,272,038 to W. M. Burstall, patented September 13, 1966, a gripping means is shown. The gripping means is combined with a tool for handling pipe. The gripping means is of an elongated configuration with intersecting groups of arcuate-shaped grooves.

In U.S. Patent No. 3,145,786 to J. V.

O'Neil et al, patented August 25, 1964, a portable drill rig is shown. The portable drill rig includes a device for gripping sections of drill pipe during the drilling operation. The gripping device includes two individual jaws having a common fulcrum. A fluid cylinder provides the force for clamping the jaws against a section of pipe.

In U.S. Patent No. 3,270,823 to A. A. Buehler, patented September 6, 1966, a drill pipe handling apparatus is shown. The drill pipe handling apparatus includes an upper set of jaws and a lower set of jaws interconnected to operate simultaneously to grip a drill pipe.

The present invention provides a gripper for a pipe handling apparatus comprising; a baseplate;

a pipe engaging surface on the baseplate for contacting and engaging a pipe;

a first jaw pivotally coupled to the baseplate, the first jaw having an elongate slot formed therein and being provided with a first pipe engaging surface for contacting and engaging the pipe;

a second jaw pivotally coupled to the baseplate, the second jaw having an elongate slot formed therein and being provided with a second pipe engaging surface for contacting and engaging the pipe;

a thrust cylinder connected to the baseplate, the thrust cylinder having a movable piston; and a pin coupled to the movable piston, and extending into the elongate slots of the first and second jaws for rotating the first jaw and the second jaw relative to the baseplate in response to movement of the movable piston to grip a pipe between the pipe engaging surface on the baseplate and the pipe engaging surfaces of the jaws.

The invention will be better understood from the following description of preferred embodiments thereof, given by way of example only, reference being had to the accompanying drawings, wherein:

Figure 1 illustrates an embodiment of

gripper in accordance with the present invention.

Figure 2 shows the gripper of Figure 1 clamped on to a section of drill pipe.

5 Figure 3 illustrates another embodiment of the present invention.

Figure 4 shows the gripper of Figure 3 clamped on to a section of drill pipe.

10 Referring now to Figure 1, a gripper constructed in accordance with the present invention is illustrated. The gripper is generally designated by the reference number 10. A pair of jaws 11 and 12 are rotatably connected to a baseplate 13 by a pair of pivot pins 14 and 15. The jaws 11 and 12 include elongated arms 16 and 17 having slots 18 and 19, respectively. A traveling projecting pin 20 fits within the slots 18 and 19. The piston rod 21 of a thrust cylinder 22 is connected to pin 20. A pair of brackets 23 and 24 connect the thrust cylinder 22 firmly to baseplate 13. The brackets 23 and 24 are affixed to the baseplate 13 by bolts 25, 26, 27 and 28. The thrust cylinder 22 is double-acting and will provide force for moving the pin 20 either toward or away from thrust cylinder 22. Fluid lines 29 and 30 channel fluid into and out of each end of the thrust cylinder 22 to force the sliding piston (not shown) to move within cylinder 22. A member 31 defining a pipe engaging surface is mounted upon the baseplate 13. Members 32, 33 defining pipe engaging surfaces are mounted on jaws 11, 12 respectively.

35 The structural details of a gripper constructed in accordance with the present invention have been described, the operation of the gripper 10 will now be considered with reference to Figure 2. The baseplate 13 is moved until the member 31 has come into contact with a section of pipe 34. Fluid is delivered through line 29 under pressure to move the sliding piston (not shown) to the retracted position. Any fluid 40 between the closed end of the cylinder 22 and the sliding piston is allowed to escape through line 30. The retraction of the sliding piston causes the traveling projecting pin 20 to move toward the thrust cylinder 22. As this happens, the pin 20 slides in slots 18 and 19. The jaws 11 and 12 rotate about pivot pins 14 and 15 thereby causing the members 32 and 33 to contact the pipe 34.

55 With the section of pipe 34 firmly connected to the pipe handling apparatus (not shown) by gripper 10, the pipe handling apparatus may be actuated to move the section of pipe 34 to a desired location. When the section of pipe 34 is to be released, fluid is transmitted through line 30 to force the sliding piston (not shown) to move away from the closed end of the cylinder 22 thereby moving the pin 20 in slots 18 and 19 and causing the jaws 11 and 60 65 12 to rotate about pivot pins 14 and 15

thereby releasing the section of pipe 34.

Referring now to Figure 3, another embodiment of a gripper constructed in accordance with the present invention is shown. This embodiment of the gripper is generally designated by the reference number 35. A pair of jaws 36 and 37 are rotatably connected to a baseplate 38 by a pair of pivot pins 39 and 40. The jaws 36 and 37 include elongated arms 41 and 42 having slots 43 and 44, respectively. A pin 45 projecting from a traveling plate 46 fits within the slots 43 and 44. The movable piston 47 of a thrust cylinder 48 is connected to the traveling plate 46. A pair of brackets 49 and 50 hold the thrust cylinder 48 in place on baseplate 38. The brackets 49 and 50 are affixed to the baseplate 38 by bolts 51, 52, 53 and 54. The thrust cylinder 48 will provide force for moving the piston rod 47, traveling plate 46 and projecting pin 45 outward away from the closed end 55 of cylinder 48. A fluid line 56 channels fluid into and out of the cylinder 48 to move a sliding piston (not shown) within the cylinder. A pair of springs 57 and 58 are connected between the traveling plate 46 and baseplate 38. The springs 57 and 58 provide a force that tends to pull the projecting pin 45, traveling plate 46, piston rod 47 and sliding piston (not shown) toward the closed end 55 of cylinder 48. A pipe engaging member 59 is mounted upon the baseplate 38. A pipe engaging member 60 is mounted upon jaw 36 and a pipe engaging member 61 is mounted upon 100 jaw 37.

The structural details of a second embodiment of a gripper constructed in accordance with the present invention having been described, the operation of gripper 35 will now be considered. Fluid is delivered through the line 56 under pressure to move the sliding piston (not shown) of the thrust cylinder 48 outward away from the closed end 55 of thrust cylinder 48. This will move the piston rod 47, traveling plate 46 and projecting pin 45 outward causing the projecting pin 45 to slide in slots 43 and 44 and the jaws 36 and 37 to open to allow a section of pipe 62 to contact the member 59. 105 The springs 57 and 58 provide a bias force tending to force the sliding piston 47, traveling plate 46 and projecting pin 45 toward the closed end 55 of cylinder 48.

The baseplate 38 is moved until the member 59 comes into contact with the section of pipe 62. Fluid is then withdrawn through the line 56 allowing the sliding piston (not shown) to move toward the closed end 55 of cylinder 48. As this happens, the projecting pin 45 slides in the slots 43 and 55 and the jaws 36 and 37 rotate about pivot pins 39 and 40 thereby causing the members 60 and 61 to contact and grip pipe 62. The springs 57 and 58 will maintain a force tending to 130

pull the sliding piston (not shown), piston rod 47, traveling plate 46 and projecting pin 45 toward the closed end 55 of cylinder 48 thereby insuring that the gripper 35 will maintain its grip on the section of pipe 62. When the section of pipe 62 is to be released, fluid is transmitted through line 56 to force the sliding piston (not shown) to move away from the closed end 55 of cylinder 48 thereby moving the projecting pin 45 in the slots 43 and 44 causing the jaws 36 and 37 to rotate about pivot pins 39 and 40 and release the section of pipe 62.

WHAT WE CLAIM IS:—

- 15 1. A gripper for a pipe handling apparatus comprising a baseplate;
a pipe engaging surface on the baseplate for contacting and engaging a pipe;
a first jaw pivotally coupled to the
20 baseplate, the first jaw having an elongate slot formed therein and being provided with a first pipe engaging surface for contacting and engaging the pipe;
a second jaw pivotally coupled to the
25 baseplate, the second jaw having an elongate slot formed therein and being provided with a second pipe engaging surface for contacting and engaging the pipe;

a thrust cylinder connected to the baseplate, the thrust cylinder having a movable piston; and a pin coupled to the movable piston, and extending into the elongate slots of the first and second jaws for rotating the first jaw and the second jaw relative to the baseplate in response to movement of the movable piston to grip a pipe between the pipe engaging surface on the baseplate and the pipe engaging surfaces of the jaws.

2. A gripper according to claim 1 including spring means for biasing the jaws into a pipe-gripping configuration.

3. A gripper according to claim 1 wherein the thrust cylinder is a double acting thrust cylinder.

4. A gripper according to any preceding claim wherein the pin is mounted on a piston rod secured to the movable piston.

5. A gripper for a pipe handling apparatus, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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